Unfortunately for this argument, however, alcohol (ethyl) is itself a biochemical product.

The fifth chapter deals with the modes of preparation and extraction of odorous compounds, and with their synthetical production. The special part of the work (pp. 67–175), devoted to the description of the general modes of preparation of the various compounds classified under chemical families, may be looked upon as a chapter of synthetical organic chemistry having special reference to the formation of odorous compounds, and requires no further comment.

The headings of chapter vi. (physical properties of odorous compounds), chapter vii. (chemical characters and relations between odour and chemical constitution), chapter viii. (quantitative valuation), chapter ix. (physiological relations), and chapter x. (applications of odorous compounds) sufficiently indicate their contents. Chapters vii. and ix. will be found of interest to physiologists as well as to chemists.

We have not found many slips in this little monograph, and it can be safely consulted by all who are interested in the subject. The statement (p. 184) that *m*-oxybenzaldehyde derivatives do not occur in nature is erroneous (see, *per contra,* Jowett, *Trans.* Chemical Society, vol. lxxvii. p. 707). Haller's important partial synthesis of camphor from homocamphoric acid (p. 145) might have been mentioned in the reference given in the foot-note. The omission of English firms from the list on pp. 20–21, and the faulty arrangement of the tables on pp. 38–57, have already been referred to.

Those chemists who, without any special knowledge of the subject, will take the trouble to look through this volume cannot but realise that a new and important branch of industry has been developed out of the ancient art of perfume making. It is apparent also that this newer development is the direct outcome of the application of chemical science—the utilisation for practical purposes of facts and principles discovered by laboratory research. It is the history of the coal-tar colour industry re-told, and we may fairly ask, as in the case of this last branch of manufacture, what is this country doing in the matter? The writer does not propose to do more than raise the question here, because the set reply of "imperfection of patent laws" and "want of duty-free spirit" will no doubt be considered all-sufficient by the majority of our manufacturers. Passing over this point, however, there is another aspect of the modern perfume industry which is of particular interest. Concurrently with the development of synthetical processes and the introduction of new products, a keen and searching examination of volatile plant oils has for many years past been systematically carried out in the laboratories of several foreign factories. Without wishing to be invidious, the firm of Schimmel and Co., of Leipzig, may fairly be named as pioneers in this branch of work. The semi-annual report of this firm is a perfect mine of information concerning the chemical composition of ethereal oils. Now the detection of the chemical constituents of products resulting from the vital activity of plants is also a matter of physiological importance, so that the workers in this field—prompted, no doubt, primarily by practical considerations—are accumulating a stock of material for which plant physiologists ought to be grateful. Certainly no physiologist can afford to ignore this material, buried though it may be in a trade publication, and worked up without direct scientific aim. But the methods employed and the results achieved are as purely scientific and far more definite than much of the work that at the present time passes into literature as physiological chemistry. We have as pretty an illustration as modern times can furnish of the action of pure science upon industry, and the reaction of industry upon pure science.

R. MELDOLA.

SYSTEMATIC BOTANY.

The Classification of Flowering Plants. Vol. i. Gymnosperms and Monocotyledons. By A. B. Rendle, D.Sc. Pp. xiv+403. (Cambridge: University Press, 1904.) Price 10*s.* 6*d.* net.

THE practice which is gaining ground, whereby, to the exclusion of the general text-book, the specialist produces a book in which he takes up merely his own branch of a scientific subject, is satisfactory both from the point of view of the author and the reader. The author is well qualified to express his opinions, and the reader cannot fail to learn much from the critical exposition which he is tolerably sure to obtain. The book under notice is significant not only because it is written by one of our leading systematists, but also inasmuch as it is one of the first taxonomic treatises—another is Willis's "Manual of Flowering Plants and Ferns"—which follows Engler's system of classification. Bentham and Hooker's classification is followed in most British herbaria and collections, but there is much to be said in favour of training students in the system which, originally propounded by Eichler, has been modified by Dr. Engler, one of the principal reasons being that the arrangement of orders, although not developmental, at any rate provides a sequence which is distinctly helpful.

Regarding the title, whereas it is now recognised that the spore-bearing shoots of some of the Pteridophyta may be called flowers, Dr. Rendle has used the term in its ordinary signification, and the first volume deals with Gymnosperms and Monocotyledons, while a second volume will be devoted to Dicotyledons.

After a short historical review of the principal systems of classification which have been proposed, the author takes up the Gymnosperms, making six classes by the inclusion of the two fossil groups, the Cordaitales and the Benettitales. A chapter upon the morphology of the Angiosperms follows, after which the remainder of the book is concerned with the classification of the Monocotyledons.

The Gymnosperms have been very much to the fore of late years, and there is nothing strikingly new in the treatment of the group. The interweaving of the fossil classes is distinctly rational, and the reader will find a good general account, including the results of modern research. A considerable number of the distinctive features of the genera appear in the general account, and a few in the enumeration of the genera, but the latter might with advantage have been expanded.

© 1904 Nature Publishing Group

Dr. Rendle has devoted much time to the Monocotyledons, so that it is with special interest that one turns to this part of the book. As might be expected, one finds here a valuable exposition of the morphology both of vegetative and reproductive organs, with a succinct account of all such doubtful and subtle questions as the morphology of the flower of Orchidaceæ, or the value of the vegetative body of the Lemnaceæ. A noticeable feature is the inclusion of so many facts concerned with the vegetative part of the plant. The various devices manifested by plants during germination, a subject in which the writer has made special investigations, receive very full treatment, and numerous anatomical details are mentioned; but perhaps more striking is the value which is attached to vegetative characters for the purpose of splitting the orders up into tribes. Thus in the Aroideæ anatomical structure and the leaf-nervature are considered by Engler to be the best distinguishing characters; in the Liliaceæ the vegetative habit is important; and Pfilzer makes use of several vegetative characters in separating the sections of the Orchidaceæ. It has already been pointed out that in the enumeration of the genera of the Gymnosperms it would be useful to have more details for comparing one with another, and the same applies to the latter part of the book, where geographical distribution is fully given to the exclusion of critical data. One misses, too, those broad generalisations, which serve as landmarks or guide-posts, until the last chapter—a most important one—in which the writer gives a general review of the important characters and relationships of the series and orders of the Monocotyledons. The author has had some difficulties with his illustrations, and the blocks prepared for the book, which on the whole have reproduced clearly, but are too crowded, suffer by comparison with the illustrations found in other descriptive works; otherwise the book forms a worthy and valuable addition to the standard series which is being issued by the Cambridge University Press, and will certainly be of very great use to students of botany.

A TEXT-BOOK OF NAVIGATION.

Modern Navigation. By W. Hall, R.N. Pp. viii+378. (London: W. B. Clive, 1904.) Price 6*s.* 6*d.*

THIS is a valuable text-book on navigation at a very moderate price. Its small size and general handiness are a great feature compared with other works on the subject. The proofs throughout the book are graphically explained so far as possible, and are easily intelligible to people with a limited knowledge of mathematics; the figures and illustrations are good, numerous examples are given throughout, and the answers are tabulated at the end of the book. The extracts from the "Nautical Almanac" necessary for working any of the examples are also given.

An excellent feature in the book is the great stress laid on navigation by "Sumner" or "position lines," which are the foundation of the present practice of navigation. Without a clear understanding of position lines it is impossible to comprehend the importance of the errors in position due to working with approximate data, such as finding longitude with D.R. latitude and *vice versâ.* These and other errors are thoroughly and clearly explained by the author; in many previous works these errors have been either neglected altogether or passed over without explanation of the methods used in compiling the tables given for their correction.

The method of obtaining position by combining position lines derived from a chronometer sight and from an ex-meridian is rendered complete by the plan given of calculating the final result by factors as opposed to plotting it. It is brief and accurate, and will be welcomed by those who have experienced the difficulties of plotting results in small ships in bad weather. A very short and accurate method of obtaining these results by the "nautical slide rule" is also given. The slide rule was Mr. Hall's invention, and is useful for ex-meridians and other computations.

The treatment of the short equal altitude as a dynamical problem tends to simplify the work, and renders it easier of comprehension. The chapter on the "new navigation" is much in advance of any previous discussion of this method; the explanation is clear and the work straightforward, and the figures required for the computation are reduced. An accurate means of obtaining the final result by calculation instead of plotting is also added to this method. Mr. Hall's treatment of the "new navigation" should greatly assist to popularise this valuable means of navigating, which is applicable to any heavenly body at any azimuth.

The investigation of errors due to inaccuracies in time and altitude is satisfactory, and many interesting problems in theoretical navigation are fully explained. A valuable feature in the book is the shortening of computation by using five places of logarithms and in some cases only four places. The chapter on tides is very simply and effectively written, and supplies a want much felt by seafaring men.

In a book where so much is good, it is a pity more stress has not been laid on the utility of twilight stars for position; the author refers to displacement of the horizon due to abnormal refraction, &c., as a cause of errors in position, but does not mention the best fix that can be obtained in the twenty-four hours at sea. Ex-meridians of stars north and south for latitude, and chronometers of east and west stars for longitude, the mean of the north and south stars for latitude and of the east and west stars for longitude, obviate the effects of displacement of the horizon, and the fix is not dependent on run between observations except to the extent of a few minutes. This fix is specially valuable to men-of-war, which, owing to manœuvres, are seldom long on a steady course, thereby causing the run between observations, taken at an interval of two or three hours, often to be inaccurate. The system of notation used throughout the book and the extensive use of Greek letters are likely to confuse men already practising their profession afloat and used to calling things by their old names; it will consequently not commend itself to them. Possibly young students

© 1904 Nature Publishing Group